

The Abbotsford-Sumas Aquifer: Development of a Transboundary Aquifer Flow Model

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Abstract

The Abbotsford-Sumas aquifer straddles the Canadian-U.S. border between the province of British Columbia and Washington State. This unconfined sand-and-gravel aquifer is considered highly vulnerable to contamination that originates primarily from agricultural land use activities. High levels of nitrates have been measured in the aquifer, and efforts are being made to alter land use practices and monitoring changes in nitrate levels. This paper reports on collaborative research between Simon Fraser University and Environment Canada to develop a regional groundwater flow and transport model for the Abbotsford-Sumas aquifer. Aquifer architecture has been described using cross-sections constructed from well and bore lithology information, and the identification of aquifer layers was determined primarily from control points for which reliable data were available. Aquifer layer topography was generated using filtered and classified well log information from the BC Water Well Database. Model boundary conditions were identified using aerial photos, but verified in field by considering geology, topographic variation, stream course and evidence of seepage. The flow model will be calibrated and used to simulate transport at a regional scale, thus providing a potentially valuable management tool for tracking and predicting non-point source contaminant migration over a large scale. The model will also facilitate the development of local small-scale models by providing the larger-scale definitions of important aquifer properties and boundary conditions. Ultimately, the model may be useful for predicting the potential effects of implementing land use scenarios on the groundwater quality. This research highlights the challenges of integrating datasets from different jurisdictions, and attempts to demonstrate that research on trans-boundary water issues can be successfully undertaken through collaboration and data sharing.